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# TWO NEW GENERA OF ISOSTICTID DAMSELFLIES FROM NEW BRITAIN, BOUGAINVILLE, AND THE SOLOMON ISLANDS (ODONATA: ZYGOPTERA)

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*Titanosticta* and *Cnemisticta* are new genera of the Isostictidae described from the eastern Papuan - Melanesian region. New species *Titanosticta macrogaster* (New Britain), *Cnemisticta angustilobata* (New Britain), and *C. latilobata* (Bougainville, Gizo, Malaita, and Guadalcanal) are also described. The two genera bear no particularly close relationship with any of the Papuan (*Selysioneura, Tanymecosticta*), New Caledonia (*Isosticta*), or Australian (seven genera) taxa.
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Key words. – Odonata, New Guinea, Solomon Islands, new genera, new species.

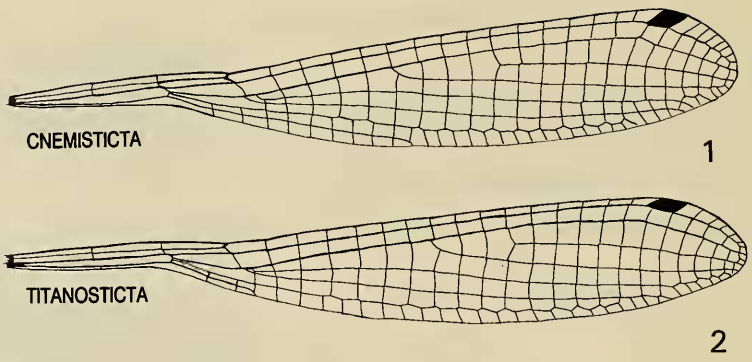
The damselfly family Isostictidae is reported from the Australian subcontinent, the Papuan region (extending westward to Tanimbar and Halmahera), and the island of New Caledonia, where the type genus occurs. In Australia, Watson et al. (1991) recognize seven genera. *Tanymecosticta* is widespread on New Guinea, has a single species in New Britain and another on Woodlark on the east, and occurs on Misool and Tanimbar on the west. *Selysioneura* is widespread on New Guinea, and occurs on Misool, Halmahera, and Morotai on the west, and Woodlark, D'Entrecasteaux, and the Louisiade Archipelago on the east. I herein describe two new Papuan genera: *Titanosticta* and *Cnemisticta,* which occur in New Britain and the Solomon Islands. The new genera overlap only slightly in range with either of the two Papuan genera: thus, they fill a geographic gap in the range of the family.

The Isostictidae had long been considered a subfamily of the Protoneuridae, but has recently been separated into a separate family, largely on the basis of larval characters (Lieftinck 1975). Adults resemble the protoneurids, and differ from most otherwise similar Oriental Coenagrionoid families by their narrow wings, with the anal portion highly reduced. They differ from the Protoneuridae by their absence of bright colours (protoneurid adults are almost invariably marked with bright colours, especially in the males), their generally longer CuP, and larvae (as far as known) with saccoid, rather than flat, caudal lamellae with subapical constriction. Some genera of Oriental protoneurids have a very short anal vein; this vein is always totally lacking in isostictids. Another character of most genera of the isostictids is a prominently and elaborately developed hind lobe of the prothorax; *Selysioneura* and one species of *Cnemisticta* are conspicuous exceptions.

Fraser (1955) discussed this group (which he considered a subfamily of the Protoneuridae) and suggested a relationship with the platycnemidids. In common with the Protoneuridae, but conspicuously different from the Platycnemididae, the Isostictidae have short legs with short leg spines. However *Cnemisticta* has a broader wing which is abruptly narrowed distal to the pterostigma and a relatively long CuP, both of which are reminiscent of the Platycnemididae. The larvae of the Platycnemididae have highly variable caudal lamellae and do not seem to form a single coherent group.

In the absence of larval forms for most genera it is not profitable at this time to suggest relationships within the family. The two new genera do not seem to have an especially close affinity with any other Papuan or Australian genus. *Cnemisticta* is notably distinct within the family because of its broader wing with abrupt terminal narrowing, and long CuP.

Abbreviations for collections in which type material is located: UZMC – Universitetets Zoologiske Museum, Copenhagen; RMNH – Rijksmuseum van Natuurlijke Historie, Leiden; TD – Collection of T. Donnelly, Binghamton.




Figs. 1-2. Venation of hind wings. – 1, *Cnemisticta angustilobata*, gen. n., sp. n. 2, *Titanosticta macrogaster*, gen. n., sp. n.

*Titanosticta* gen. n.
(figs. 2, 3-7)

This is the largest damselfly in the family Isostictidae and one of the longest Zygoptera in the Oriental region. It is distinguished by the short CuP, which is two cells long (rarely one). Also, Ac is just proximal to Ax1 in the fore wing, and slightly distal in the hind wing; the arculus is distal to the Ax2 of both wings; IR2 arises at the 7-8th Px of the fore wing and at 6 or 7th (rarely 5th) in the hind wing; R4+5 arises distal to the subnodus. The pterostigma is rhombic and longer than broad. The wing is narrowed gradually distal to the pterostigma. The inferior appendage of the sole species is much larger than the superior. In common with other genera of the family, the legs are short with short spines, and the body colours are dull.

Type species: *T. macrogaster* sp. n.; the only known locality is New Britain.

Etymology: 'Titan', from mythology, signifying very large size, and '-sticta', the predominant suffix for genera in this family.

In addition to its very large size, *Titanosticta* is distinguished from all other isostictid genera by the following combination of characters: inferior appendage much larger than the superior; CuP two cells long, vein R4+5 arising distal to subnodus, very small tarsal claws, and Ac close to Ax1 in the fore wing and slightly distal to Ax1 in the hind wing.

*Titanosticta macrogaster* sp.n.
(figs. 2, 3-7)

Type material. – Holotype ♂: Papua New Guinea. New Britain. Yalom, 1000 m, 20 May 1962. Noona Dan Exped. (UZMC). Allotype ♀: Papua New Guinea. New Britain. Metelen River, 20 mi. S.E. of Ruango, July 1970, V. Jindrich (RMNH). Paratypes: 2 ♂ same locality as holotype, 19-20 May 1970 (RMNH, TD); 1 ♂ Papua New Guinea. New Britain. Metelen River, 20 mi. S.E. of Ruango, July, 1970, V. Jindrich (TD).

Additional material. – An additional ♀ in the Donnelly collection, with the same data as Metelen River paratype, is not designated a paratype because it lacks both a head and the terminal segments of the abdomen.

Male holotype. – This is an obscurely marked species varying from pale gray brown to dark, shining brown.

Head: Labium pale with rounded triangular central excavation about 2/5 the length of the segment. Face mainly pale; labrum shining black with thin apical yellow rim and pale central, basal spot; postclypeus pale with prominent black anterior and lateral margins; frons pale with small black spots anterior and posterior to antennae and irregular black central stripe enclosing front of lateral ocelli and median ocellus; pedicel about 1.5 times the length of the scape, both pale.

Prothorax: Pale, small paired central black spots on hind lobe and very small black marks on remainder pronotum; hind lobe sharply recumbent, broadly T-shaped, with a basal constriction.

Pterothorax: Mesostigmal laminae small, slightly tapered apically, with rounded tips; pterothorax grayish green; mesepisternum with stripe on dorsal carina occupying 1/6 of sclerite; very thin dark line on antehumeral suture; 2nd lateral suture with small dark spot on caudal sixth.

Legs: Yellow with contrasting dark spines: 4 on outer row of hind femur, 5 on hind tibia.

Wings: Venation described in generic diagnosis; venation brown, rhombic, pale red brown.

Abdomen: Pale, darker at tip; 1 and 2 greenish gray; 3 to 8 yellow, darkening apically; 9 and 10 shining dark brown. Superior appendage dark, shorter than 10, constricted apically to terminate in rounded, cylindrical tip, with low, rounded basal-ventral prominence. Inferior appendage 1.5 times length of superior, forcipate, laterally flattened, expanded abruptly in caudal half, excavate on dorsal-apical corner to

Table 1. Characters of genera of Isostictidae. – Explanation: CuP: Number of cells length; both wings considered. Inferior appendage: of male, whether large or smaller than superior appendage. Hind lobe of prothorax, male: whether prominent (flared, with horns, or with other processes) or low. Ac or Ax1: which crossvein is in more distal position in hind wing. Tarsal claws: size compared with other coenagrionoids. R4+5: origin of vein with respect to nodus.

| Genus | Range | length of CuP, cells | male inferior appendages | hind lobe prothorax male | tarsal claws | R4+5 to nodus | hw: Ac or Ax1 distal |
|---|---|---|---|---|---|---|---|
| *Isosticta* | New Caledonia | 1 - 6 | equal | prominent | normal | distal, proximal, or aligned | Ax1; some spp. nearly aligned |
| *Selysioneura* | New Guinea, Misool, Halmahera, Morotai, Woodlark, D'Entrecasteau, Louisiade Arch. | 0 - 1 | smaller | low | very small | distal | Ax (nearly aligned in some spp) |
| *Tanymecosticta* | New Guinea, New Britain, Woodlark, Misool, Tanimbar | 1 | slightly smaller | prominent | small | distal | Ax |
| *Titanosticta* | New Britain | 2 (1) | larger | prominent | very small | distal | Ax |
| *Cnemisticta* | New Britain, Bougainville, Solomon I. | (7) 8 - 10 (11) | larger | prominent or low | normal | proximal | Ac |
| *Rhadinosticta* | Australia | 1 | larger | prominent | normal | proximal | Ax1 |
| *Oristicta* | Australia | 1 | smaller | prominent | very small | distal | Ac |
| *Neosticta* | Australia | 5 - 6 | smaller | prominent | normal | proximal | Ac (close) |
| *Labidiosticta* | Australia | 0 - 2 | smaller | prominent | very small | distal | Ax1 |
| *Eurysticta* | Australia | 1 - 2 | smaller | prominent | normal | proximal | Ax1 |
| *Lithosticta* | Australia | 5 - 7 | equal | prominent | normal | proximal | Ax1 |
| *Austrosticta* | Australia | 4 - 6 | larger | prominent | normal | proximal | Ac (close) |

form two rounded tips. Penis with terminal segment Y-shaped.

Female allotype. – Similar to male, but face more pale: labrum yellow with obscure paired lateral spots; anteclypeus mottled brown; postclypeus pale with brown anterior and lateral margins, this dark colour extended posteriorly in center and at lateral extremes; top of head gray-green, black as follows: short transverse dashes anterior to median ocellus; jagged transverse stripe enveloping median ocellus extending posterior to lateral ocelli.

Thorax: Hind lobe of prothorax quadrate, scarcely narrowed at base, the central portion of hind rim excavate in the center with a medial, rounded knob. Colour of side of thorax greenish yellow. Basal segments of abdomen as in male; 5 terminal abdominal segments lacking.

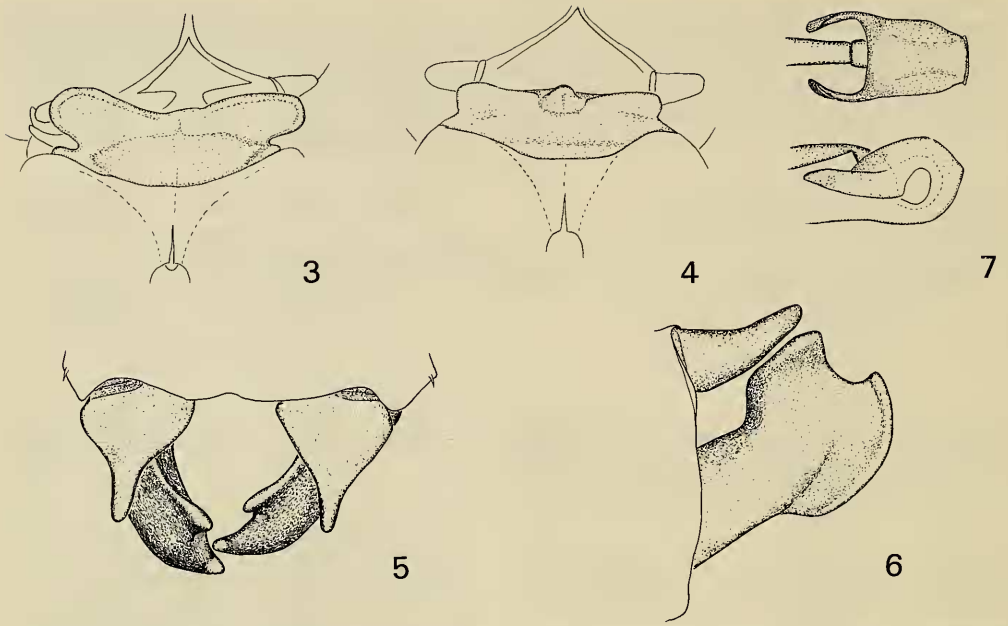
Dimensions. – Holotype male: abdomen 60.5 mm, hind wing 32 mm. Allotype female, hind wings dissimilar, 29.5 and 31 mm.

The dimensional range of the paratype series is as follows: two males have abdomens 46 and 63 mm, and hind wings 32-32.5 mm. The 2nd female has the hind wing 30 mm.

Variation within paratype series. – The three males have notably different abdomen lengths. The Metelen River male has the abdomen (46 mm) more than a centimeter shorter than the Yalom males (60.5 and 63 mm), but the hind wing of this specimen (29 mm) is only slightly shorter than the other two (32 mm). There are only trivial differences among the three males in colour pattern. One male has a broader black stripe on mesepisternum (¼ rather than ⅓ the width of the sclerite). The females, which are both regrettably incomplete, appear essentially identical.

Etymology. – The name, a noun in apposition, refers to the very long abdomen.

Remarks. – The difference in abdomen length of the males (which have very similar hind wing lengths) violates the normally firm linear allometric relationship (in this case the ratio between abdomen and hind wing) among Zygoptera. The constancy of this ratio can be attributed to the necessity of maintaining a uniform dimensional ratio to enable the insect to fly vigorously. There are similar disparities in this di-




Figs. 3-7. *Titanosticta macrogaster,* gen. n., sp. n. – 3, male hind lobe of prothorax, dorsal view. 4, female hind lobe of prothorax, dorsal view. 5, male abdominal appendages, dorsal - lateral - apical view. 6, male abdominal appendages, lateral view. 7, penis, ventral and lateral view.

mensional ratio among New World Pseudostigmatidae, which have extremely long abdomens and which fly much less vigorously than other Zygoptera. The violation of a constant ratio in the few specimens of *Titanosticta* raises the question as to whether the flight of this genus (which has not been recorded) might resemble the weak flight of the pseudostigmatids.

### *Cnemisticta* gen. n.
(figs. 3, 8-23)

This genus contains two species of large isostictids. It is immediately recognized by the length of CuP, which in the type species *C. angustilobata* is 8 to 10 cells long in the fore wing) and 8 (rarely 7) to 10 (rarely 11) in the hind wing. IR2 arises at the 7-8th Px in the fore wing (rarely 9th) and 5 to 6th in the hind wing. In *C. latilobata* IR2 arises at the 5-6th (rarely 7th) Px in the fore wing and 4-5th Px in the hind wing; CuP is 8-10 cells long in the fore wing and 7-9 in the hind wing. In both species vein Ac arises just distal to the Ax1 of the fore wing and ⅓ the distance between the 1st and Ax2 in the hind wing; the arculus is distal to the Ax2 in both wings; R4+5 arises proximal to the subnodus in both wings. The pterostigma is rhombic and as wide as long. The tarsal claws are of normal length and the inferior abdominal appendage of the male is much larger than the superior. The two species range from New Britain to Bougainville, Gizo, Malaita, and Guadalcanal.

Type species. – *C. angustilobata* sp. n., from New Britain.

Etymology. – 'Cnem-' from the slight resemblance to some platycnemidids.

This genus is distinguished from all other isostictids by its much longer CuP and abrupt narrowing of the wing beyond the pterostigma. The two species vary from each other in the extent of development of the hind lobe of the prothorax. The species *C. latilobata* has a very prominent hind lobe, similar to that of *T. macrogaster,* and to most of the other members of the family. The species *C. angustilobata* has a highly reduced hind lobe, in common with the most widespread Papuan isostictid, *Selysioneura.*

### *Cnemisticta angustilobata* sp. n.
(figs. 1, 8-15)

Type material. – Holotype ♂: Papua New Guinea. New Britain: Yalom, 1000 m, 18 May 1962, Noona Dan Exped. (UZMC). Allotype ♀: same data as holotype, except coll. 19 May 1962 (UZMC). Paratypes: 3♂ 1♀ same data as holotype except coll. 18-19 May 1962 (RMNH); Papua New Guinea. New Britain. Metelen River, 20 mi. S.E. of Ruango, July 1970, V. Jindrich (TD); 1 ♂ Papua New Guinea. New

Britain: Gazelle Pen., upper Warango, 250-600 m, 28-30 Nov 1962, J. Sedlacek (RMNH).

Additional material. – 4 additional ♂ collected by Sedlacek (RMNH) along with last named paratype are not designated as paratypes because they lack the terminal segments of the abdomen.

**Description**

Male holotype. – This is a dark, obscurely marked damselfly.

Head: labium pale with rounded excavation in apical ⅓; frons rounded; face and top of head black; labrum black with pale, obscurely defined central stripe; genae pale, anteclypeus obscurely pale; pedicel slightly longer than scape, both dark; rear of head pale.

Prothorax: Pale laterally, mottled dark on dorsum, with large tringular paired dark spots on median lobes; apodyne extended posteriorly as commissure nearly to hind lobe; hind lobe small and low, rounded triangular with central part slightly thickened.

Pterothorax: Mesostigmal laminae simple, parallel sided, rounded, slightly elevated lateral tip; mesepisternum black, mesepimeron dark with pale on mesal ¼ (adjacent to antehumeral suture) and cephalic ¼; mesinfraepisternum pale on outside, central half dark; the dark colour of the mesepisternum essentially extensive to metepisternum with only thin pale lines on the two lateral sutures; metepisternum pale with black spot on caudal ⅓; metepipimeron and metastermum pale.

Legs: Pale with thin dark dorsal lines on femora; spines brown, not contrasting with legs, 5 on hind femur and hind tibia.

Wings: Venation as for genus; IR2 arising at 7 (fore wing) and 5 (hind wing); CuP 9 cells long in fore wing and hind wing; pterostigma rounded, rhombic, as long as wide, pale reddish brown.

Abdomen: Pale, dark on dorsum of 1 and 2, obscurely dark on dorsum of 3 to 7, with apical ¼ distinctly darker on 3 to 6; 7 uniform; 8 with obscurely dark dorsal mark in caudal ⅔; 10 with obscure paired dark spots on caudal ⅓. Superior appendage shorter than 10, blunt, rounded, slightly expanded and branched in dorsal view, with mesal branch very short; with ventrally directed spine. Inferior appendage more than twice as long than superior, forcipate, laterally flattened, with caudal half expanded into prominent rounded keel on dorsal and apical portions. Penis with terminal segment Y-shaped.

Allotype female. – Similar to male. Face pale; postclypeus pale with dark lateral margins; top of head pale, about half dark, with an irregular dark mark centered on the ocelli, small dark spots anterior to antennae, and short transverse dark stripes posterior to lateral ocelli. Thorax: Hind lobe of prothorax similar to male but slightly larger, low triangular, with a stepped appearance. Colour of thorax: mesepisternum with pale stripe above antehumeral suture ¼ the width and in the cephalic ⅗ of the sclerite; mesepimeron with short central elongate dark mark; Metepisternum with small caudal dark mark. Abdomen: Dorsum of 8 to 10 pale; ovipositor dark, extending distinctly beyond 10 (cerci).

Dimensions. – Holotype male: abdomen 44 mm, hind wing 29 mm. Allotype female: abdomen 45.5 mm. The dimensional range of the paratype series is as follows: 5 paratype males have the abdomens 43.5 to 47.5 mm; 8 males have the hind wing 26 to 29 mm. A paratype female has the abdomen 45.5 mm and the hind wing 32.

Variation within paratype series. – The Gazelle Peninsula and Metelen River males are paler than the Yalom series; the dark colour of the side of the thorax ranges to a short central dark mark on mesepimeron and metepisternum almost totally pale.

Etymology. – The name refers to the vary narrow hind lobe of the prothorax.

### *Cnemisticta latilobata* sp. n.
(figs. 16-23)

Type material. – Holotype ♂: Solomon Islands. Malaita I., Kware'a River and tributaries, 8 km E of Dala, 100m, 19 Feb 1987, T. Donnelly (RMNH); Allotype ♀ Solomon Islands. Guadalcanal I., Honiara, Rove Creek at Reservoir, 13-14 Feb 1987, T. Donnelly (RMNH). – Paratypes: 1♂ same data as holotype (TD), 1♂, Papua New Guinea, Bougainville I., South Nasiooi, Agriculture Field Station, 19 May 1975, Howard R. Wimmer (RMNH).

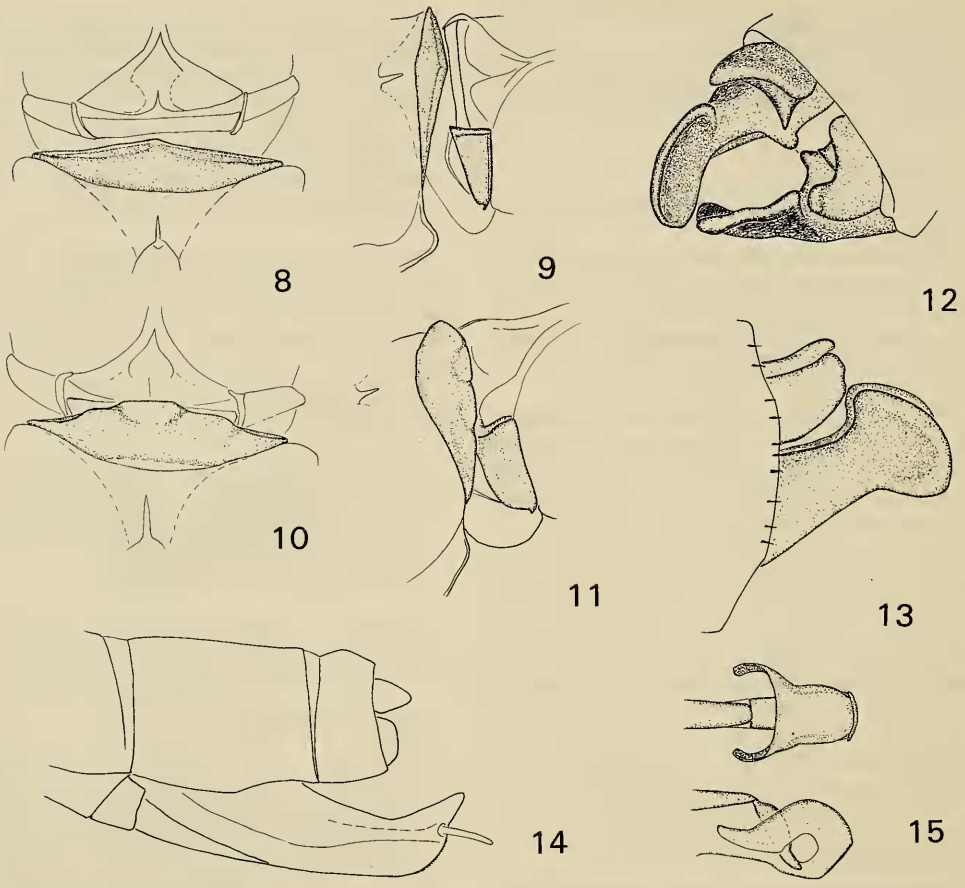
Additional material. – 1♂ Solomon Islands. Gizo I., low bush area in valley, 7,8 May 1975, H. Wimmer (specimen lacks terminal segments of abdomen) (RMNH), 1♂ Papua New Guinea. Bougainville I., Boku Bong, 5 June 1956, J. L. Gressitt (RMNH) (highly teneral specimen).

**Description**

Holotype male. – A pale, obscurely mottled, damselfly.

Head: Labium white, with a quadrate apical excavation ⅓ of its length; frons rounded; face black, labrum with thin yellow apical rim; genae brown with yellow mesal margin; pale pedicel slightly longer than dark scape; top of head black bordered at rear by yellow; obscure pale spots lateral to lateral ocelli; rear of head yellow.

Prothorax: pale, fore lobe with dark rim; medial lobes low, apodyne continued into a commissure nearly to hind lobe; hind lobe large, T-shaped, sharply recumbent, basally constricted, and sharply notch in center of hind rim.

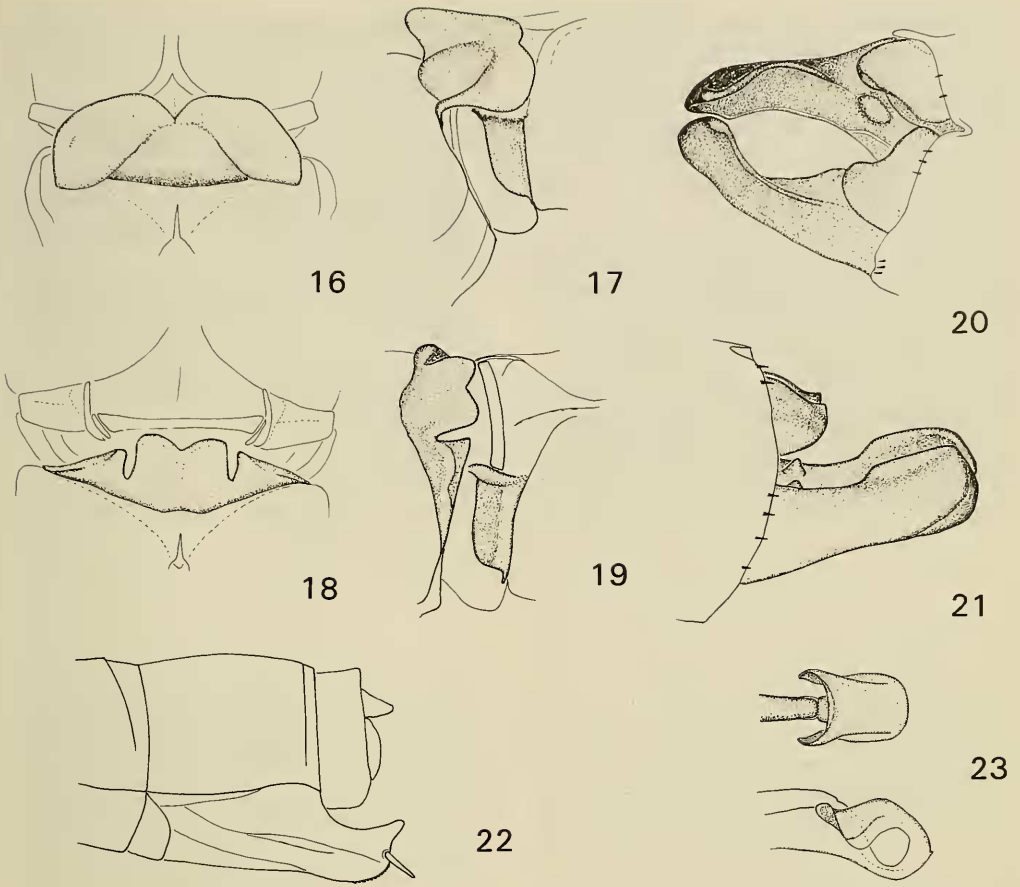



Figs. 8 - 15. *Cnemisticta angustilobata,* gen. n., sp. n. – 8, male hind lobe of prothorax, dorsal view. 9, male hind lobe of prothorax and mesostigmal lamina, dorsal- lateral view. 10, female hind lobe of prothorax, dorsal view. 11, female hind lobe of prothorax and mesostigmal lamina, dorsal- lateral view. 12, male abdominal appendages, dorsal - lateral - apical view. 13, male abdominal appendages, lateral view. 14, ovipositor. 15, penis, ventral and lateral views.

Pterothorax: Mesostigmal laminae parallel sided, flat, with rounded tips; colour of pterothorax pale; mesepisternum with dark stripe on dorsal carina occupying ¼ of sclerite; antehumeral suture with thin black line; 2nd lateral suture with tiny black spot on caudal ⅛. Legs: Yellow, with 4 contrasting black spines (outer row) on hind femur, 5 on hind tibia. Wings: Venation as in generic diagnosis; IR2 arising at 6 (fore wing) and 5 (hind wing); CiP 8 (fore wing), 9 (hind wing) cells long.

Abdomen: Pale laterally and darker dorsally; 3 and 4 dominantly pale dorsally, slightly darker in basal half and on apical ¼; 5 obscure, darker on apical ¼; 6 slightly pale in basal ⅛; 7-10 dark, with limited pale on sides, 8 and 9 with pale longitudinal dorsal lines on basal ½, tapering caudally. Superior appendage brown, shorter than 10, rounded and expanded apically in dorsal view, with rounded, upturned apices. Inferior apendage 3 times as long as superior, forcipate, with blunt, laterally flattened, rounded tip and dorsal keel on expanded apical half, and with low, rounded, conical, dorsally directed spine in basal ¼. Penis with terminal segment Y-shaped.

Allotype female. – Similar to male. Head: Face pale, paired dark spots anterior to lateral ocelli. Small rounded pale protuberances on rear of head. Thorax: Hind lobe of prothorax prominent, triangular, divided into three nearly equally wide lobes by deep sulci; the central lobe emarginate, and the two lateral lobes low and tapering laterally to points. Colour of thorax: Mesepisternum pale, thin black line adjacent to pale dorsal carina; thin black line along caudal half of antehumeral suture; mesepimeron with an obscure cen-




Figs. 16-23. *Cnemisticta latilobata* gen. n., sp. n. – 16, male hind lobe of prothorax, dorsal view. 17, male hind lobe of prothorax and mesostigmal lamina, dorsal-lateral view. 18, female hind lobe of prothorax, dorsal view. 19, female hind lobe of prothorax and mesostigmal lamina, dorsal- lateral view. 20, male abdominal appendages, dorsal-lateral-apical view. 21, male abdominal appendages, lateral view. 22, ovipositor. 23, penis, ventral and lateral views.

tral dark mark deflected laterally in cephalic portion. Abdomen: 9 and 10 with prominent pale basal-lateral spots; ovipositor pale, extends to end of 10 (cerci).

Dimensions. – Holotype male: abdomen 39 mm, hind wing 26 mm. Allotype female: abdomen 35.5 mm, hind wing 26.5 mm. The dimensional range of the paratype series is as follows: 2 paratype males have abdomens 37 and 38.5 mm; 3 paratype males have the hind wing 24 to 26 mm. The 2nd female specimen is very teneral; the hind wing is 27 mm.

Variation within paratype series. – The male from Bougainville has the pale colour of the top of the head more extensive than the holotype, extending anteriorly nearly to the antennal bases. A very teneral female specimen has the hind lobe of the prothorax longer and apparently more Y-shaped than the allotype. However the apparent difference in shape could be due to twisting upon drying.

Etymology. – The name refers to the wide and decorative hind lobe of the prothorax.

Remarks. – The two species of *Cnemisticta* resemble each other in their peculiarly wide and apically abruptly narrowed wings, the long CuP, and the male abdominal appendages. The species *angustilobata* is slightly larger than *latilobata*. The species differ most prominently in the hind lobe of the prothorax, which is prominently developed in *latilobata* and reduced in *angustilobata*. The species *latilobata* is pale, but with a darker abdomen, and *angustilobata* is dark, but with a paler abdomen. The allotype female of *latilobata* has

a rounded prominence on the rear of the head; this is lacking in *angustilobata*. The female of *angustilobata* has a much longer ovipositor than *latilobata*. The venation of the two species (above) differs more than is appropriate for the slight dimensional differences between the two species.

## Acknowledgements

I am indebted to the RMNH, Leiden, for the loan of specimens which M. A. Lieftinck had been studying at the time of his death. I am further very grateful to Vladimir Jindrich, at that time a graduate student in our department, for specimens of two of the new species collected during a geological trip to New Britain. Comments from Drs. Jan van Tol and Anthony Watson on a draft of the manuscript have been very helpful and are gratefully acknowledged; I am further grateful to Dr. Watson for the loan of specimens of four Australian genera which enabled me to complete the table of generic characters.

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